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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:	)	Before the Examiner
	)	Jennifer A. Poker
Frederic Cattaneo	)	
	)	Group Art Unit 2832
Serial No. 10/630,463	)	
	)	
Filed July 30, 2003	)	
	)	
MAGNETIC CIRCUIT WITH COIL	)	June 29, 2005

TRANSMITTAL OF APPEAL BRIEF
PATENT APPLICATION -- 37 C.F.R. §41.37

Mail Stop Appeal Briefs-Patent
Commissioner for Patents
P.O. Box 1450
Arlington, VA 22313-1450

Sir:

1. Transmitted herewith is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on May 9, 2005.

2. STATUS OF APPLICANT

This application is on behalf of other than a small entity.

I hereby certify that, on the date shown below, this correspondence is being deposited with the United States Postal Service in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 as "Express Mail Post Office to Addressee."

Express Mail Label No. EV466870913US

Sheryl L Hutchings
Signature of Person Mailing

Sheryl L. Hutchings
Printed Name of Person Mailing

June 29, 2005
Date

3. FEE FOR FILING APPEAL BRIEF

Pursuant to 37 C.F.R. §41.20(b)(2), the fee for fling the Appeal Brief is $500.00.

4. EXTENSION OF TERM

None.

5. TOTAL FEE DUE

The total fee due is:

Appeal brief fee $500.00

Extension fee (if any) $0

TOTAL FEE DUE $500.00

6. FEE PAYMENT

Authorization is hereby made to charge the amount of $500.00 to the Credit Card as shown on the attached Credit Card information authorization form PTO-2038.

7. FEE DEFICIENCY

If any additional extension and/or fee is required, and/or if any additional fee for claims is required, charge the Credit Card as shown on the attached Credit Card information authorization form PTO-2038.

Respectfully submitted,

Date: June 29, 2005

By: _____

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MAGNETIC CIRCUIT WITH COIL	)	June 29, 2005

APPEAL BRIEF (37 C.F.R. §41.37)

Mail Stop Appeal Briefs-Patent
Commissioner for Patents
P.O. Box 1450
Arlington, VA 22313-1450

Sir:

This Appeal Brief is in furtherance of the Notice of Appeal, filed in this case on May 9, 2005. The fees required under §41.20 are dealt with in the accompanying Transmittal of Appeal Brief.

I hereby certify that, on the date shown below, this correspondence is being deposited with the United States Postal Service in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 as "Express Mail Post Office to Addressee."

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I. REAL PARTY IN INTEREST
(37 C.F.R. §41.37(c)(1)(i))

The real party in interest in this appeal is Liaisons Electroniques-Mecaniques LEM S.A., of Chemin des Aulx 8, 1228 Plan-Les-Ouates, Switzerland.

II. RELATED APPEALS AND INTERFERENCES
(34 C.F.R. §41.37(c)(1)(ii))

With respect to other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, there are no such appeals or interferences.

III. STATUS OF CLAIMS
(37 C.F.R. §41.37(c)(1)(iii))

The status of the claims in this application are:

A. TOTAL NUMBER OF CLAIMS IN APPLICATION

Claims in the application are 1-9.

B. STATUS OF ALL THE CLAIMS

1. Claims cancelled: None.
2. Claims withdrawn from consideration but not cancelled: None.
3. Claims objected to: None.
4. Claims allowed or confirmed: 4-7.
5. Claims rejected: 1-3, 8, and 9.

C. CLAIMS ON APPEAL

The claims on appeal are: 1-3, 8, and 9.

IV. STATUS OF AMENDMENTS
(37 C.F.R. §41.37(c)(1)(iv))

The Applicant's Rule 116 Amendment After Final Action was entered by the Examiner for purposes of appeal in the Examiner's Advisory Action mailed February 10, 2005.

V. SUMMARY OF CLAIMED SUBJECT MATTER
(37 C.F.R. §41.37(c)(1)(v))

Independent claim 1 claims a magnetic circuit (1), comprising an electrical coil (2) and a magnetic core (3), for use as a current sensor, wherein the coil (2) comprises a conducting wire (6), an end plate (4) and a connector (5), and the connector comprising a housing (9) and terminals (8) for electrical connection of the electrical coil to an electronic device, with the end plate (4) and connector (5) being arranged at respective first and second ends of the coil (2), and the coil including the end plate and connector mounted on the magnetic core (3) formed of a single tore-shaped magnetic wire with an air-gap, whereby the coil, end plate and connector define a central cavity in which the magnetic core is inserted. (See specification p. 4, lines 4 to p. 7, line 8, and Figures 1-4)

Independent claim 4 claims a process for making a magnetic circuit with coil of claim 1, comprising the steps of making said coil (2) by winding a conducting wire (6) on a mandrel (12) having first and second ends, the first end being configured in a smaller diameter than the second end, such that they form a conical shape in a direction of insertion of the coil on the magnetic core; subsequently inserting the coil (2) on the magnetic core (3), the magnetic core comprising a magnetic material in a form of an open spire having ends (16, 16'), the open spire being formed before providing the magnetic material with specified magnetic properties; and then deforming the ends (16, 16') of the magnetic core (3) in a substantially orthogonal direction (O) to a plane of the

magnetic circuit in order to move the ends closer together. (See specification p. 4, lines 4, to p. 7, line 8, and Figures 5-7)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL
(37 C.F.R. §41.37(c)(1)(vi))

Claims 1 and 9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No.. 6,480,088 in view of U.S. Patent No. 5,583,475 and yet further in view of U.S. Patent No. 6,762,666.

Claims 2 and 3 stand rejected under 35 U.S.C. 103(c) as being unpatentable over U.S. Patent No. 6,480,088 in view of U.S. Patent No. 5,583,475, yet further in view of U.S. Patent No. 6,762,666, as applied to claim 1, and further in view of U.S. Patent No. 6,232,863.

Claim 8 stands rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,480,088 in view of U.S. Patent No. 5,583,475, and yet further in view of U.S. Patent No. 6,762,666, as applied to claim 1, and further in view of U.S. Patent No. 4,408,639.

VII. ARGUMENT – REJECTIONS UNDER 35 U.S.C. §103
(37 C.F.R. §1.192(c)(8)(iv))

The Examiner has finally rejected **claims 1 and 9** under 35 USC 103 as being unpatentable over US 6,480,088 (Okamoto) in view of US 5,583,475 (Raholijaona et al), yet in further view of US 6,762,666 (Chu).

In the final Office Action, the Examiner stated her opinion that it is obvious to combine the teachings of Okamoto with the teachings of Raholijaona to form a coil with a central cavity in order to slip a core therethrough, in further view of Chu, which discloses a toroidal core having an air-gap on one side of the body of the core.

Applicant believes, however, that this reasoning is erroneous since both Okamoto and Chu teach in the opposite direction to the invention as defined in Applicant's **claim 1**. Both Okamoto and Chu disclose coils that are wound around a closed toroidal magnetic core that is completely closed and would thus make it impossible to insert a coil with a connector and end plate on the magnetic core. While Chu may disclose one of the toroidal cores with an air-gap, at least one other toroidal core is completely closed (see Figures 1-4, 5, and 7 of Chu), whereby the core with an air-gap is stacked with a core without an air-gap.

It is well-known in common mode choke coils to provide a toroidal magnetic core that is continuous, in other words, which does not have an air-gap. Choke coils have continuous toroidal magnetic cores in order to increase coupling between the two coils and to reduce leakage flux. In the present invention, an air-gap is used to position a magnetic field sensor therein in order to measure the magnetic field circulating in the magnetic circuit. In a choke coil, the toroidal magnetic core is used to couple the magnetic fields generated by the two magnetic coils, which generate magnetic fields in opposed directions, but of similar magnitude in order to cancel the common mode effects. The coils are connected in series to an electrical conductor (*i.e.* the opposite poles of the conductor in question) in order to cancel out the common mode noise in the conductor. The wire of the coils must therefore be able to carry the current intensity of the electrical line, which generally means that the conductor wires are not very fine, but are generally of relatively large diameter (compared to wires of a secondary coil of an electrical current sensor). Moreover, a large number of turns creates a very high inductance that may cause excessive heating (considering that the coils are connected in series to the electrical lines), such that the number of turns in common mode coils are generally not very high, as compared to the secondary coil of an electrical current sensor. A thin varnish layer is only desirable or of importance where very thin wires are

used and a very compact coil should be produced. This is, however, not sought after in choke coils, since the coil wires carry the primary current and are therefore of relatively large diameter and have relatively few turns around the toroidal magnetic circuit. In Okamoto, therefore, the skilled person does not at all seek to replace grade two wires with grade one wires. More importantly, however, in order to use the teachings of Raholijaona in Okamoto, the skilled artisan would have to split the toroidal core of Okamoto in order to insert the coil according to the teachings in Raholijaona. In order to have the most efficient coupling between the two coils of Okamoto, however, the skilled artisan would specifically seek to reduce leakage flux, which is one of the main aims of Okamoto. By splitting the toroidal magnetic circuit, there would be an increase in leakage flux, which would therefore go against the teachings of Okamoto. A skilled artisan would thus not only have no motivation to combine Raholijaona with Okamoto, but would in fact be taught in the opposite direction.

Applicant further maintains that, even if the skilled artisan were to combine Raholijaona with Okamoto, which is not admitted, he/she would not arrive at the invention according to Applicant's **claim 1**, since Okamoto does not disclose both a connector and an end plate arranged proximate respective first and second ends of the magnetic coil. The protection plate identified by the Examiner serves to carry a magnetic shield strip in Okamoto and in no way is it mounted at an end of either of the two separate coils shown in Okamoto. The protection plate is also not mounted on the toroidal magnetic core with a central cavity in which the magnetic coils are inserted as required by Applicant's **claim 1**. The protection plate in Okamoto is mounted around the magnetic circuit and magnetic coil. In this regard, it should be noted that the Examiner has not identified all the claimed features that are within Okamoto, but has merely stated that the protection plate is

"located on an opposite side of the base plate." (Office Action mailed June 4, 2004 at page 2, paragraph 3(3).)

The additional toroidal core with air-gap disclosed in Chu merely functions to reduce saturation, however, it is stacked with a closed toroidal core without an air-gap for the purpose of reducing leakage flux and to increase the coupling between the two coils (in Chu, the two coils that are coupled are referenced as 110 and 120).

Thus, the combination of Okamoto, Raholijaona and Chu would not lead to the invention according to Applicant's **claim 1**, and in fact Chu and Okamoto both teach in the opposite direction in that they each disclose two coils wound around at least one continuous toroidal core such that it would be impossible to insert the coils on the core and impossible to insert an end plate and connector on the magnetic core, as required by Applicant's **claim 1**.

Applicant's **claim 1** recites that there is a single magnetic core with air-gap. As already argued, the protection plate in Okamoto is mounted around both the magnetic circuit and magnetic coil and neither the end plate nor the connector comprises a central cavity in which the magnetic core is inserted. As already discussed above, this would, in fact, be impossible since both Okamoto and Chu disclose toroidal cores that are completely closed (at least one in Chu), whereby it would be impossible to have a connector or end plate with the central cavity inserted thereon.

As concerns Applicant's **claim 9**, the Examiner has merely stated that Okamoto illustrates that the base plate/connector plate contains holes through which ends of the wire/coil are positioned, which does not correspond to the language of Applicant's **claim 9**. **Claim 9** requires that the connector housing comprises a guide portion around which the portion of the coil is wound, such feature not being specifically disclosed in any of the prior art cited.

The Examiner was respectfully invited to indicate where in Okamoto, Chu, or any of the other prior art there is a connector housing comprising a guide portion around which a portion of the coil is wound, as specified in Applicant's **claim 9** (with further regard to **claim 1**), but did not do so.

The Examiner has finally rejected **claim 8** as being unpatentable over US 6,480,088 (Okamoto) in view of US 5,583,475 (Raholijaona et al) and yet further in view of US 6,762,666 (Chu) as applied to **claim 1**, and further in view of US 4,408,639 (Hayama et al).

Hayama is cited by the Examiner as disclosing an end plate having coil means that guides a filament wire, such that the feature of Applicant's **claim 8** would have been obvious to the skilled person in view of Okamoto, or Raholijaona. However, the end plate referred to by the Examiner in Hayama is part of a coil manufacturing apparatus, and not part of an end plate that is part of a magnetic circuit, as required by Applicant's **claim 8** in view of **claim 1**. Thus, Hayama in fact teaches in the completely opposite direction, by encouraging the skilled person to use an end plate on the apparatus, and not at the end of a coil that is inserted on the magnetic core, as required in Applicant's **claim 8**.

The Examiner has finally rejected **claims 2 and 3** as being unpatentable over US 6,480,088 (Okamoto) in view of US 5,583,475 (Raholijaona et al) yet further in view of US 6,762,666 to Chu, as applied to **claim 1**, and further in view of US 6,232,863 (Skinner et al).

Concerning **claims 2 and 3**, Applicant believes that a skilled person would not consider the teachings of Skinner, since they relate to an ignition coil that is in a completely different technical field from a magnetic circuit or current sensor. Even if the skilled person were to consider Skinner, which is not admitted, the value of the angle shown in Skinner is so far off the range claimed in Applicant's **claims 2 and 3** that the skilled person would not arrive at the value tan α ranging

between 0.001 and 0.01 in application of *re Aller*. In this regard, Applicant is of the opinion that since the value of tan α in Skinner is significantly larger than the Applicant's claimed range, even if the skilled artisan were to consider Skinner, such an artisan would work around the range disclosed in Skinner, which is so far off the Applicant's claimed range that it would not involve mere routine skill to arrive at the claimed range.

VIII. APPENDIX OF CLAIMS

(37 C.F.R. §41.37(c)(1)(viii))

The text of the claims involved in the appeal are:

1. A magnetic circuit (1) comprising an electrical coil (2) and a magnetic core (3), for use as a current sensor, wherein the coil (2) comprises a conducting wire (6), an end plate (4) and a connector (5), the connector comprising a housing and terminals for electrical connection of the electrical coil to an electronic device, the end plate and connector being arranged at respective first and second ends of the coil (2), the coil including the end plate and connector being mounted on the magnetic core (3) formed of a single tore-shaped magnetic wire with an air-gap, whereby the coil, end plate and connector comprise a central cavity in which the magnetic core is inserted.

2. The magnetic circuit with coil according to claim 1, wherein an inner cavity (7) of the coil (2) has a slightly conical shape in a direction extending from the first end to the second end of the coil.

3. The magnetic circuit with coil according to claim 2, wherein an angle α of the cone has a value tan α between 0.001 and 0.01.

8. The magnetic circuit with coil according to claim 1, wherein the end plate comprises a guide portion (11) around which a portion of the coil is wound.

9. The magnetic circuit with coil according to claim 1, wherein the connector housing comprises a guide portion around which a portion of the coil is wound.

IX. APPENDIX OF EVIDENCE
(37 C.F.R. §41.37(c)(1)(ix))

None.

X. APPENDIX OF RELATED DECISIONS
(37 C.F.R. §41.37(c)(1)(x))

None.

Respectfully submitted,

Date: June 29, 2005

By: _____

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